**UNIVERSITY OF GONDAR**
**FACULTY OF VETERINARY MEDICINE**

# ASSESSMENT OF PROBLEMS ASSOCIATED WITH ARTIFICIAL INSEMINATION SERVICES IN DEBRE TABOR TOWN

**DVM THESIS**

**BY**

**ALAZAR WORETAW**

**JUNE, 2015**
**GONDAR, ETHIOPIA**

**UNIVERSITY OF GONDAR**
**FACULTY OF VETERINARY MEDICINE**

# ASSESSMENT OF PROBLEMS ASSOCIATED WITH ARTIFICIAL INSEMINATION SERVICES IN DEBRE TABOR TOWN

A thesis submitted to the Faculty of Veterinary Medicine, University of Gondar in partial fulfillment of the requirements for the degree of Doctor of Veterinary Medicine

**BY**

**ALAZAR WORETAW ALENE**

**JUNE, 2015**

**GONDAR, ETHIOPIA**

**ASSESSMENT OF PROBLEMS ASSOCIATED WITH ARTIFICIAL INSEMINATION SERVICES IN DEBRE TABOR TOWN**

**By**

**Alazar Woretaw**

**Board of external examiners** **signature**

**1. Prof Abebaw Gashew** _____
*School of Vet Med, Jimma University*

**2. Prof Tadelle Tolla** _____
*School of Vet Med, Jimma University*

**3. Dr Gelagay Ayelet (Assoc prof)** _____
*National Veterinary Institute (NVI), Ethiopia*

**4. Dr Fufa Dawo (Assoc Prof)** _____
*FVM,Addis Abeba University*

**5. Dr Ahimed Yassin (Assoc Prof)** _____
*FVM,Wollo University*

**6. Dr Dessie Shiferaw (Assoc Prof)** _____
*FVM,Hawassa University*

Academic advisor:

Dr .Bemirew Admasu (DVM) _____

## TABLE OF CONTET

## LISTS OF TABLES

## LISTS OF ABBREVIATIONS

| | |
|---|---|
| AI | Artificial insemination |
| AIT | Artificial insemination Technician |
| AV | Artificial vagina |
| CSA | Central statistical Agency |
| EASE | Ethiopian Agricultural sample Enumeration |
| GDP | Gross domestic product |
| MOA | Ministry of Agriculture |
| NAIC | National artificial insemination centre |
| SIDA | Swedish International Development Agency |
| SPSS | Statistical package for social science |

**ACKNOWLEDGEMENS**

First of all I would like to thank “Bata-Lemaryam,Lideta-Lemaryam and Tsadkane Maryam” for helping keeping me from serous dangerous and allowed to exist until this time.

I have special respect and very grateful to my advisor Dr. Bemrew Admassu for his technical support, advice and encouragement during my research work and thanks to my Mcs frind Yidinekachew wonde to support laptop and for his advice.

My special thanks go to my golden families to alovely father Ato Woretaw Alene and to my mother Zelalem Tsegaw. I would like also to thank my brothers Mengstu Woretaw and Adugna Woretaw and also thanks to my sweet sisters Yewb dar Woretaw and Misker woretaw for their moral and economical support.

Last but not least my great thanks towards my girl friends who advice to be strength for the obstacle of my life and to show bright futures.

**ABSTRACT**

Artificial insemination is recognized as the best biotechnological technique for increasing reproductive capacity and has received widespread application in farm animals. A cross sectional study was conducted from November 2014 to April 2015 with the objective of assessing the problems associated with artificial insemination service in and around Debre Tabor town. In this study, a structured questionnaire was used and 400 respondents were interviewed. Descriptive statistics were used for analysis of the data. According to the study result, 34.2% of the smallholder dairy farmers have got artificial insemination services regularly and without interruption while 65.8% of them do not due to unavailability of artificial insemination technicians 44.8%, discontinuation of service on weekends and holidays 32.2% and lack of inputs 25.0% with statistical significance between kebele ($P<0.05$) for shortage of AITS and inputs. Conception failure 38.3%, unavailability of artificial insemination technicians 19.5%, disease 32.5% and both conception failure and unavailability of artificial insemination technicians 20.0% were the major identified constraints of artificial insemination delivery system. From 275 no satisfied dairy farmers 111 (42.0%) passed the date without breeding cows by artificial insemination and natural mating and also164 (58.0 %) used natural mating and waiting the next time to use artificial insemination services and statistically significant difference was found among dairy farmers. Similarly, from 125 satisfied dairy farmers 6 (5.1%) passed the date without breeding the cow with Artificial insemination and natural mating and also119 (42.0%) used natural mating and waiting the next cycle to use artificial insemination services. Mastitis, tuberculosis and problems associated with calving were the major disease that hindered proper breeding of AI service. Generally, the questionnaire surveys indicated that artificial insemination is not doing well in the study kebeles. Therefore, artificial insemination service requires urgent measures to change the situation to achieve success.

**Key words:** *Artificial insemination, constraints, Debre Tabor, Dairy cattle*

## 1. INTRODUCTION

The total cattle population for the rural sedentary areas of Ethiopia is estimated to be 43.12 million, of which 55.41% are females. Out of the total female cattle population, only 151,344 (0.35%) and 19,263 (0.04%) heads are hybrid and exotic breeds, respectively. With an average lactation length of 6 months and an average daily milk production of 1.44 litters per cow, the total milk produced during the year 2006/07 was recorded to be 2.634 billion litters. This suggests that the total number of both exotic and hybrid female cattle produced through the crossbreeding work for many decades in the country is quite insignificant indicating unsuccessful crossbreeding work. This again suggests that Ethiopia needs to work hard on improving the work of productive and reproductive performance improvements of cattle through appropriate breeding and related activities (CSA, 2006).

In spite of the presence of large and diverse animal genetic resources, the productivity (meat and milk) of livestock remains low in many developing countries including Ethiopia for various reasons such as inadequate nutrition, poor genetic potential, inadequate animal health services, and other management related problems (Lobago, 2007). Cattle breeding are mostly uncontrolled in Ethiopia making genetic improvement difficult and an appropriate bull selection criteria have not yet been established, applied and controlled (Tegegn *et al*., 1995). Although artificial insemination, the most commonly used and valuable biotechnology has been in operation in Ethiopia for over 30 years, the efficiency and impact of the operation has not been well-documented (Himanen and Tegegn, 1998).

It is widely believed that the artificial insemination (AI) service in the country has not been successful to improve reproductive performance of dairy industry (Sinishaw, 2004). AI service is weak and even declining due to inconsistent service in the smallholder livestock production systems of the Ethiopian highlands. The problem is more aggravated by wrong selection and management of AI bulls along with poor motivations and skills of inseminators (GebreMedhin, 2005).

Hence, the objectives of this research are:

- To asses and identify the problems associated with artificial insemination services in and around Debre Tabour town.
- To inspire the owners to use artificial insemination service for a better improvement of livestock production and productivity.
- To generate information for the better application on the sector and to recommend and give feedback to decision makers to take appropriate majors on it.

## 2. LITERATURE REVIEW

### 2.1. Cattle Production in Ethiopia

In Ethiopia, dairy cattle breed improvement belonging with long history, through crossbreeding of local stock with exotic breed. In line with this, different initiatives have been made to promote crossbreeding. These include, establishment of national artificial insemination centre (NAIC), cattle, sheep and poultry breed improvement and multiplication centre, with the major aim to distribute improved animals to smallholder (Bekele, 2005).

Ethiopia has an estimated cattle population of about 41.5 million heads. Around 99.45 are indigenous breeds, with very few hybrids 0.5%, and exotic 0.1%. Cattle production together with the production of other livestock sectors has been known to be an important component of the agricultural sector. Livestock contributes much by providing meat, milk, cheese, butter, export commodities (live animals, hides and skins), draught power, manure, near-cash capital stock (EASE, 2003).

It is known that no enough selection and improvement for productivity has been performed on the indigenous cattle. Nevertheless, the indigenous cattle are known to have special merit of coping with the harsh environments of the country. On the other hand, the high performing exotic cattle cannot cope with the harsh environments of the country. Therefore, improvement on the indigenous cattle for productivity without losing traits, which are essential for survival, has been proposed (MoA, 1996).

## 2.2. ARTIFICIAL INSEMINATION

Artificial insemination is a technique by which semen is introduced artificially into the body of the uterus at the time of heat in an attempt to cause pregnancy**.** Artificial insemination (AI) has been defined as a process by which sperm is collected from the male, processed, stored, and artificially introduced into the female reproductive tract for the purpose of conception (Morrow *et al*., 1985; and; Webb, 2003). Artificial insemination has become one of the most important techniques ever devised for the genetic improvement of farm animals. It has been widely used for breeding dairy cattle as the most valuable management practice available to the cattle producer and has made bulls of high genetic merit available to all (Webb, 2003; Bearden *et al*., 2004).

In livestock rearing, the producer makes efficient use of the generous supply of sperm available from an individual male in a manner that greatly increases genetic progress, as well as improving reproductive efficiency in many situations. Today, many bulls have been reported to produce sufficient semen to provide enough sperm for 40,000 breeding units in one year. Using the long accepted standard of 10 x 106 motile sperm at the time of insemination with an average initial motility of 60% and a 33.3% loss of sperm during freezing and thawing, the number of breeding units would entail 1 x 1012 total sperm. Semen is collected from the bull, deep-frozen and stored in a container with Liquid Nitrogen at a temperature of minus 196 degrees Centigrade and made for use. The use of AI in Ethiopia is growing but estrus detection is difficult owing to poorly expressed estrus of Zebu breeds (Mukassa-Mugerwa *et al*., 1989).

### 2.2.1. History of artificial insemination

The first successful AI was performed in Italy in 1780 and over 100 years later, in 1890, it was used for horse breeding (Webb, 2003). In Russia, however, the method was first taken up seriously as a means of improving farm animals (Heinonen, 1989).

The first artificial vagina (AV) was reportedly devised by G. Amantea, which was used to collect semen from the dog. In the years that followed, numerous Russian researchers developed artificial vagina for the bull, stallion, and ram. The method of semen collection using artificial vagina has been reported to be closest to the natural conditions and is assumed to yield the most normal ejaculate of all methods used. An attempt has been made to simulate the normal or best

temperature, pressure, lubrication, and position to obtain the optimum response of the male. The AV consists of an outer rigid or semi rigid support with an inner jacket containing controlled-temperature water and pressure and collecting funnel and container (Sorensen, 1979).

In Ethiopia, AI was introduced in 1938 in Asmara, the part of Ethiopia, which was interrupted due to the Second World War and restarted in 1952. It was again discontinued due to unaffordable expenses of importing semen, liquid nitrogen and other related inputs requirement. In 1967 an independent service was started in the Arsi Region, Chilalo Awraja under the Swedish International Development Agency (SIDA) (Yemane *et al*., 1993).

In Ethiopia, there is often complaint of the AI service, by service users for imbalance female and male ratios of calves born in which the latter exceeds in percentage, which is against the interests of most of the beneficiaries. Breeding using AI or natural mating affected male: female calf ratio, which gives sense and can be applicable if the system works. However, the reason why natural mating gave more female progenies than males for cows mating to AI is not clearly known (Bekele, 2005).

Although AI was introduced long years ago in the country, it is still unsuccessfully performing, due to technical, system related, financial and managerial problems. Among the technical constraints, poor heat detection skills, communication and transport problems hamper timely insemination, poor semen collection and storage technology and handling procedures that affect semen quality, and inefficiency of AI technicians. Other system related problems include small herds; disperse locations, limited production intensity and unaffordable cost for the service. It would also be difficult for the countries to bear costs for the production of liquid nitrogen and purchase of necessary equipments (Yemane *et al*., 1993).

### 2.2.2. Advantages and disadvantages of artificial insemination

Maximum use of superior sires has been considered as the greatest advantage of AI while natural service has been linked to limit the use of one bull, probably, to less than 100 mating per year (Webb, 2003). The author further showed that AI usage enabled one dairy sire to provide semen for more than 60,000 services in one year Gebremedhin (2005) has listed many advantages of AI including prevention of reproductive diseases, control of inbreeding, minimizing the cost of

keeping bulls for natural service and others. Besides, the availability of accurate breeding records such as breeding dates, pregnancy rates, inter-oestrus intervals, and days to first service used to monitor fertility are other advantages of AI (Sinishaw, 2004).

Artificial insemination, however, has disadvantages that include poor conception rates due to poor heat detection and inefficiency of AI technicians, dissemination of reproductive diseases and poor fertility rates if AI centers are not equipped with appropriate inputs & are not well managed. Other disadvantages include high cost of production (collection and processing), storage and transport of semen, as well as budget and administrative problems and inefficiency (GebreMedhin, 2005).

### 2.3. Semen Collection and Assessment of Ejaculates

Semen collection has been considered like harvesting any other farm crop (Bearden *et al*., 2004) since effective harvest of semen involves obtaining the maximum number of sperm of highest possible quality in each ejaculate to make maximum use of sires. This involves proper semen collection procedures used on males that are sexually stimulated and prepared. The initial quality of semen has been determined by the male and cannot be improved even with superior handling and processing methods. However, semen quality can be lowered by improper collection and the processing techniques (Bearden *et al*., 2004).

Realization of the maximum benefits of AI depends upon the collection of maximal numbers of viable sperm cells at frequent intervals from genetically superior males (Cole and Cupps, 1977). The success of AI depends on the collection of a relatively large numbers of potentially fertile spermatozoa from genetically superior sires (GebreMedhin, 2005).

#### 2.3.1. Facilities needed for semen collection

The routine collection of semen for AI in dairy and beef bulls is by using artificial vagina. Several essential features have been considered in designing 12 facilities for collecting semen, of which the safety of the handler and the collector have been found to be the most important in bulls in dairy farm. Safety fences, usually constructed of 7.6 cm. steel pipe with spaces large enough for a person to step through at 2.44 meters intervals, should be provided. The collection area must provide good footing to prevent slipping and injury to the male being collected. An

earthen floor in the immediate collection area best provides this. Means to restrain the teaser animals to minimize lateral as well as forward movement must be provided. At the same time, easy access for semen collection must be maintained (Morrow *et al*., 1985; Roberts, 1985; Bearden *et al*., 2004).

Appropriate and specialized facilities, equipments, and procedures have been used during collection of semen to prevent injury to the bulls and their handlers, to maximize the physiological responsiveness of the bulls in producing semen and to enhance the quantity and the quality of the semen that can be collected (Garner, 1991). The area for semen collection has been preferred clean, relatively quiet, and free of distractions and any other stressful procedures. There has been a report of increase in spermatozoa motility by 50% through proper sexual stimulation of the bulls (Salisbury *et al*., 1978).

### 2.3.2. Procedure for collection of semen from the bull

Standard semen collection procedures normally include sexual stimulation, sexual preparation, and collection of the semen (Herman *et al*., 1994). Sexual stimulation providing a stimulus situation that elicits mounting behaviour in the bull is termed “Sexual Stimulation” (Herman *et al*., 1994). The stimulation process has been best practiced by exposing the bull to a mount animal in a collection environment and allowing moving briefly around female/teaser for a couple of minutes (Morrow *et al*., 1985).

Sexual preparation has been found to determine the intentional prolongation of sexual stimulation. It is achieved through a series of false mounts (allowing the bull to mount but not ejaculate) and restraint and ultimately results in an increase in the quantity and quality of sperm ejaculated. In dairy bulls, one false mount plus two minutes of restraint plus two additional false mounts before each ejaculation will help obtain the maximum amount of good quality semen (Herman *et al*., 1994).

2.3.3. Methods of semen collection

*Massage*: semen has been collected from the bull, in most instances, by massage. The bull is restrained and the gloved arm and hand are lubricated before inserting through the anus into the rectum. The area of the ampulae, vesicular glands, and prostate is located under the rectum. The fingertips then are used to exert a downward pressure milking this area caudally. This stimulates and mechanically causes the sperm to be passed through the urethra by gravity to drip from the prepuce (Sorensen, 1979; Roberts, 1985).

*Vaginal insert*: consists of a tapered insert with a flange on the end that may be placed in the vagina prior to copulation (Sorensen, 1979). Urethral fistula: the male urethra may be cannulated with a tube just under the anus with a T-type cannula allowing passage of urine through the urethra proper or collection of sperm under the anus at the time of copulation (Sorensen, 1979; Roberts 1985).

2.3.4. Assessment of ejaculate

Monitoring of qualitative semen characteristics has been indicated to be an important function of the AI laboratory. The assessment is done in terms of physical appearance, volume, mass activity and spermatozoa motility (Herman *et al*., 1994).

Physical appearance: the gross appearance of freshly collected bull semen has been described usually to be the first measure of quality made by the semen laboratory. Neat (unaltered) semen normally appears as a thick whitish to slightly yellowish fluid whose consistency is mainly determined by the number of spermatozoa it contains. Normal bull semen has very little odour (Herman *et al*., 1994). The microscopic appearance of bull's semen varies between ejaculates, individual bulls, breed, and age. Normal bull semen is generally white or yellowish creamy in color (Zewdie *et al.,* 2005).

Volume: the volume has been reported to decline when young bulls are used or when there is frequent ejaculation or incomplete or failure of ejaculation and in bilateral seminal vesiculities (Garner, 1991; Hafez, 1993). Furthermore, those authors have described in summary that a number of factors like season of the year, method of collection, and the sexual preparation of the

bull have been known to affect semen volume. The volume of bull's semen varies between ejaculates, individual bulls, breed, and age. However, a bull with less than 2ml of semen per ejaculate is not acceptable (Zewdie *et al*., 2005).

Mass activity: The mass activity is evaluated by putting a drop of semen onto a slide without cover slip under low magnification (100X). A rapid wave motion with formation of eddies at the end of waves indicate a good quality of semen (Zewdie, *et al*., 2005).

Spermatozoa motility: The individual sperm motility is evaluated by taking small drops of semen onto a slide with cover slip under high magnification (200X). Sperm cells moving in a straight-line forward direction are considered in the motility measure. In order to be acceptable bull semen should have at least 70% and 40% motility respectively at the time of collection and after freezing (Zewdie *et al.*, 2005)

## 2.4. Application of Artificial Insemination

### 2.4. 1. Estrus and estrus detection

Estrus has been defined as a period when the female shows characteristic sexual behaviour in the presence of a mature male, such as immobility, raising the hind quarters or arching the back, pricking of the ears-features that are collectively termed lordosis in small laboratory animals; mounting and riding behaviour between females is also common (Gomes, 1977; Hunter, 1980; Heinonen; 1989; Herman *et al.,* 1994; Bearden *et al*., 2000; Bekana *et al*., 2005; GebreMedhin, 2005).

Where AI or hand mating is being used, oestrus detection is the most important limiting factor for optimum reproductive performance. Insufficient and/or inaccurate oestrus detection leads to delayed insemination (with in oestrus and post-partum), reduced conception rates and thus extended calving intervals (Daris, 1998).

Since the fertile life of eggs in most species is relatively short and sperm may require capacitation before they are capable of fertilizing ova, insemination should precede ovulation. Ovulation is difficult to determine routinely, so inseminations are usually related to the time of onset of estrus. Estrus in the cow is characterized by the psychic manifestation of heat. The cow may bawl

frequently, is usually restless, may attempt to mount other animals, and will stand to be mounted/standing heat. The vulva is swollen and mucus is often secreted (Gomes, 1977).

### 2.4.2. Timing of insemination

Fertilization of the ovum has been reported to occur in the oviduct at the junction of the isthmus and ampulla. The life span of the ovum is around 12 – 18 hours and its viability decreases with time. About 8 hours after service sufficient spermatozoa have reached the isthmus of the oviduct. For fertilization to take place, capacitation of the spermatozoa is required. Capacitated sperm cells show a hyper motility and have undergone the acrosome reaction. The life span of spermatozoa is limited. If insemination takes place too early, the sperm cells will die before fertilization of the ovum can occur. Conversely, when insemination is over delayed, the ovum has lost its capacity to be fertilized (Daris, 1998). In the cow, maximum fertility has been achieved if inseminated from mid oestrus to the end of oestrus (Gomes, 1977).

### 2.4.3. Control of estrus

The main reasons for estruses control are: induction of estruses in lactating dairy cows that are not observed in oestrus by 45 days post-partum, synchronization of groups of heifers for insemination with semen of easy calving bulls, reduction of the time necessary for estrus detection, to facilitate the use of AI under extensive conditions, synchronization of donor and recipient cattle for embryo transfer and induction of ovarian activity in beef cows with lactation anoestrus. The oestrus cycle can be regulated pharmacologically to induce or control the time of estrus and ovulation (Morrow *et al.*, 1985; Daris, 1998; Bekana *et al*., 2005)

*Methods of controlling oestrus*: In cattle with active ovaries, the oestrous cycle can be manipulated by administration of prostaglandin to induce early regression of the corpus luteum (Bekana *et al*., 2005). More logical and satisfactory way of oestrus detection by far would be a situation in which the oestrous cycles of animals to be bred could be controlled by a pharmacological or pseudo-physiological treatment such that the time of onset of oestrus could be predicted in the great majority of animals receiving the treatment (Hunter, 1980).

In essence, therefore, a system of oestrous cycle control would attempt to detect the desired time table of breeding rather than permitting females to impose their own reproductive rhythms on the

farming system. Synchronization of estrus has been known to have many advantages including the reduction of time needed for detection of estrus (Hunter, 1980; Hailu, 2007). Synchronization of estrus and ovulation can be conducted by the use of either, PGF2α or GnRH or the combination of the two where the former is injected 7 days before the latter to induce a new follicular wave (Hailu, 2007).

### 2.4.4. Factors affecting success of artificial insemination

The site of semen deposition has been an important factor in the success of AI in cattle. In addition, the deposition of semen in the uterine body resulted in a 10% higher non-return rate than did cervical deposition (Macpherson, 1968). An increase in the conception rate has been reported when semen was deposited in the uterine horns rather than the uterine body (Senger *et al*., 1988). In contrast, no difference was found in the fertilization rate, conception rate or no return rate, respectively, between uterine body and uterine horn inseminations (Williams *et al*., 1988; and McKenna *et al*., 1990)**.**

The major factors that determine AI efficiency are heat detection skills, fertility level of the herd, semen quality, and efficiency of inseminators. Similarly, a successful insemination requires the acquisition of quality semen from a bull, the detection of estrus in the female, and the ability to properly place the semen in the reproductive tract of the female (Damron, 2000).

The success of AI depends upon various factors such as the efficiency, capacity and commitment of AI centers in procedurally and ethically producing, processing, handling and distributing semen; the commitments and efficiencies of AITs; proper heat detections by farmers and other factors (GebreMedhin, 2005).

### 2.4.5. Artificial insemination and fertility rates

Fertility is measured by calving rate to first service for artificially inseminated dairy cattle Conception rate at first breeding provides a useful estimate of the conception rate for a herd. However, it is a measurement that combines the effects of semen quality, fertility of the cow, timing of insemination, semen handling and insemination techniques, as well as factors such as high environmental temperature and stress (Hafez, 1980).

In USA, conception rate of virgin heifers has been found relatively constant at approximately 65% to first service conception; whereas the first service conception rates for lactating cows has decreased approximately 33% from 60 to 40 %. The number of services per conception is directly related to the conception rate in the herd. Female fertility, male fertility, environmental factors, and techniques used in AI are the four general multitude factors that determine the ultimate outcome of conception per insemination. Female fertility refers to any factor directly related to the heifer/cow that may alter her probability of becoming pregnant, including condition of the reproductive tract, nutritional status, changes in body condition from calving to insemination, age, and breed (Hafez, 1980).

There is a great reduction in fertility during the summer for lactating cows than for non-lactating heifers. High milk yield intensifies the effects of heat stress on conception and is related to increased metabolic rates and reduced thermoregulatory ability for cows with high milk yield. Techniques used in AI include accuracy of heat detection, timing of insemination, semen handling, and placement in the reproductive tract. Fertility in cattle is affected by environmental, genetic, disease, and management factors (Mukasa-Mugerwa and Tegegn, 1989).

In Ethiopia, Several factors have been reported to influence the number of services per conception. Breeding taking place during the dry season required more services per conception than the short and long rainy seasons (HaileMariam *et al*., 1993; Negussie *et al*., 1998). Management factors such as accuracy of estrus detection, timing of insemination, insemination technique, semen quality, skill of pregnancy diagnosis have been reported to affect number of services per conception (Shiferaw *et al*., 2003). Higher number of services per conception might also result from repeat breeding due to infectious and/or noninfectious diseases (Bekele *et al*., 1991).

## 3. MATERIALS AND METHOD

### 3.1 Study area

A cross sectional study was conducted from November, 2014 to April, 2015 in and around Debre Tabor town**.** Debre Tabor is a town and woreda in north-central Ethiopia which is located in the South Gondar Zone of the Amhara Region of Ethiopia, about 100 kilometers southeast of Gondar and 50 kilometers east of Lake Tana. This historic town has a latitude and longitude of 11°51′N 38°1′E11.850°N 38.017°E with an elevation of 2,706 meters (8,878 ft) above sea level. The presence of at least 48 springs in the area contributed to the development of Debre Tabor. Based on 2007 national census conducted by the central statistical agency of Ethiopia, this town has a total population of 5, 5596 of whom 27,644 are men and 27,952 women. The climate is warm and temperate. In winter there is much less rain fall than in summer. The average annual temperature is $15\,^{0}_{C.}$ The average annual rain fall is 1497 mm (CSA, 2008). The livestock population in the area comprises of cattle (8,202), goat (22,590), sheep (2,695), horse (1,065) and donkey (9,001) (CSA, 2008). Across-sectional study was conducted in five kebeles (the five kebeles were selected from in and around Debrer Tabour town). Hence Ajbar, Woyblla, Abaregagn, Mello and Segogebeya were selected. All the study areas were purposively selected because it was believed that these areas are the ones where an AI service is exercised.

### 3.2. Study population

Artificial insemination technicians in Debre Tabor town, animal health professional and dairy cattle owners in five randomly selected kebeles were represented in the study population.

### 3.3. Study design

A cross-sectional type of study supported by questionnaire survey was carried out from November 2014 to April 2015 in five randomly selected kebeles dairy owners and AITS live in and around Debre Tabor town.

### 3.4. Sample Size Determination and Sampling Procedures:

The sample size was determined based on the expected prevalence of 50% and absolute desired precision of 5% at confidence level of 95% according to the formula provided by Thrusfield (2005). This is calculated by using the following formula:

$$n = \frac{1.96^2 \times P_{exp}(1-P_{exp})}{d^2}$$

Where! n= required sample size

$P_{exp}$= expected prevalence

$d^2$= desired absolute precision (5%)

Based on this formula, the total numbers of respondents were 384. However, to increase the precision, a total number of respondents were rise into 400.

### 3.5. Data Collection Methods

3.5.1. Questionnaire survey

Structured questionnaires were prepared to interview dairy cattle owners, AI technicians to collect data on the status of AI services and constraints associated with the service. In questionnaire survey, 400 respondents (390 dairy farmers, 4 animal health and production professional and 6 artificial insemination technicians) were interviewed and during the interview process, every respondent included in the study was briefed about the objective of the study before starting presenting the actual questions. Then the questions were presented to the respondents.

### 3.6. Data Management and Analysis

The data collected were entered and scored in Ms excel worksheet and coded and entered to SPSS version 16.0 statistical packages for windows and analysis were made. The data was summarized using descriptive statistics analysis such as percentages, tables and chi square.

## 4. RESULTS

### 4.1. Results of assessment of Artificial insemination problems

From 400 respondents data was collected by questionnaires survey in five selected kebeles found in and Debre Tabor town. A total of 280 (69.9%) were not satisfied by artificial insemination service but only 120 (30.1%) were satisfied by artificial insemination service .There was statistically significant difference ($p<0.05$) among the kebeles in shortage of artificial insemination technician (AIT) and shortage of input ,but there is no statistically significant difference ($P>0.05$) in the holidays services of weekends and in signs of estruses used in order to report cows for artificial insemination service in kebeles ($p>0.05$). The least artificial insemination service usages in weekends and holidays found in Woybla kebele (6.1%). The greatest shortage of AIT present in Ajbare kebele (74.5%) while the slightest in segnogebeya kebele 9 (11.0%).The chief value of shortage of input also present in Ajbare kebele (41.5%)

Table 1 Artificial insemination used in different times and condition.

| | WHS | | SAITS | | SI | |
|---|---|---|---|---|---|---|
| Kebele | Total | No | Total | Yes | Total | Yes |
| Ajbar | 94 | 50(53.2) | 94 | 70(74.5)) | 94 | 39(41.5) |
| mello | 87 | 22(25.3) | 87 | 29(33.3) | 87 | 29(33.3) |
| segnogebeya | 82 | 12(14.6) | 82 | 9(11.0) | 82 | 6(7.4) |
| Woyeblla | 82 | 5(6.1) | 82 | 21(25.6) | 82 | 6(7.4) |
| Abaregagne | 55 | 40(72.2) | 55 | 50(90.9) | 55 | 19(34.5) |
| Total | 400 | 129(32.2) | 400 | 179(44.8) | 400 | 100(25.0) |
| X2 | 3.449 | | | 1.355 | | 48.957 |
| P-Value | 0.486 | | | 0.00 | | 0.00 |

*Key:* WHS=Weekends and holiday service. *SAIT*= Shortage of AI technicians, SI= Shortage of inputs**.**

### 4.2. Results of AI service problems identified in the study site

AI service problems identified in the study site are conception failure, in availability of AITS and death. Among these conception failure was the most and higher in kebele Ajbbare (42%) and less in Abaregagne. Others problems of AI service summarized in (Table 2).

Table 2: Major AI service problems identified in the study site

| Problems of AI service | Kebeles | | | | | Total No.of respondant (%) |
|---|---|---|---|---|---|---|
| | Ajbar | Mello | Segno gebeya | Woyblla | Abaregagne | |
| Conception failure | 36(38.3) | 27(31.0) | 38(46.3) | 27(32.9) | 19(34.5) | 147(36.8) |
| In availability of AITS | 17(18.1) | 17(19.5) | 6(7.3) | 12(14.6) | 10(18.2) | 62(15.5) |
| Death | 28(29.8) | 33(37.9) | 28(34.1) | 25(30.5) | 16(29.1) | 130(32.5) |
| Conception failure and in availability of AITS | 13(13.8) | 10(11.5) | 10(12.2) | 18(20.0) | 10(18.2) | 61(15.2) |
| Total | 94 | 87 | 82 | 82 | 55 | 400(100) |

### 4.3. Results of assessment of signs of oestrus used in order to report cows to be inseminated for AI service

The results of signs of estrus used in order to report cows to be inseminated for AI service in the study areas are presented in (Table 3).There was no statistically significant difference among the study areas in signs of estrus used to report cows to be inseminated for AI service ($p=0.084$), which is ($p>0.05$).

Table 3: The results of signs of estrus used to report cows for AI service

| Signs of estrus | Kebele | | | | | Total | $X^2$ | P_value |
|---|---|---|---|---|---|---|---|---|
| | ajbar | Mello | Segno gebeya | woyeiblla | abaregagne | | | |
| Mount other cows | 51(54.3) | 52(59.8) | 47(57.3) | 46(56.1) | 26(47.3) | 222(55.5) | | |
| Redness of vulva | 13(13.8) | 8(9.2) | 5(6.1) | 5(6.1) | 6(10.9) | 37(9.2) | | |
| In appetence | 11(11.7) | 13(14.9) | 16(19.5) | 12(14.6) | 8(14.5) | 60(15.0) | | |
| restlessness | 19(20.2) | 14(16.1) | 17(20.7) | 17(20.7) | 13(23.6) | 80(20.0) | | |
| total | 94 | 87 | 82 | 82 | 55 | 400 | 17.201 | 0.373 |

### 4.4. Results of Assessment of Problem from Dairy Owners:

The results of cows and heifers pass without breeding from AI and natural mating in the study areas presented in (Table 4). There was statistically significant difference among the study kebeles in pass without breeding from AI and natural mating (P=0.00). From 275 non-satisfied dairy farmers 111 (42.0%) the cows and heifers Passed without breeding from AI and Natural mating and also 164 (58.0%) used natural mating and waiting the next time to use AI service.

Table 4: Cows pass without breeding from AI and natural mating

| Satisfaction | Pass without breeding from AI and Natural mating | | Total | x2 | P-value |
|---|---|---|---|---|---|
| | No | Yes | | | |
| Satisfied | 119(42.0%) | 6(5.1%) | 125 | 66.892 | 0.00 |
| Non_satisfied | 164(58.0%) | 111(42.0%) | 275 | | |
| Total | 283(70.0%) | 117(29.2%) | 400 | | |

There was statistically significant difference among the study kebele in used natural mating (P=0.00). From 280 non-satisfied dairy owners 102 (38.2%) the cows and heifers was used natural mating and also 178 (61.8%) was pass without breeding from AI and natural mating and waiting the next time to use AI service. The results in the study areas were presented in (Table 5).

Table 5: One-way analysis of variance in the use of natural mating for cow and heifers.

| Satisfaction | Used Natural Mating | | Total | P-value |
|---|---|---|---|---|
| | No | Yes | | |
| satisfied | 110(38.2%) | 10(8.9%) | 120 | |
| Non-_Satisfied | 178(61.8%) | 102(38.2%) | 280 | 0.00 |
| Total | 288(72.0%) | 112(28.0%) | 400 | |

### 4.5. Results of perception of AI beneficiaries on insemination time.

The perception of AI beneficiaries' on time of insemination depends on sign of heat of dairy cattle. Therefore, when their cows and heifers shown heat afternoon of the day, 40.9% of households inseminate at morning of the next day and which is the writ time of insemination but, the rest 59.1% of households inseminate their cows in the wrong time, shown in (Table 6).

Table 6:. Awareness of AI beneficiaries on time of insemination during heat period**.**

| Cows and heifers shown heat at afternoon | | | Cows and heifers shown heat at morning | |
|---|---|---|---|---|
| Time of insemination | N | % | N | % |
| After noon of that day | 26 | 6.6 | 169 | 42.1 |
| Morning of the next day | 164 | 40.9 | 62 | 15.5 |
| Afternoon of the next day | 54 | 18.5 | 31 | 7.9 |
| The day after the next day | 36 | 9.0 | 0 | 0.0 |
| At the time of AITs available | 54 | 13.5 | 54 | 13.5 |
| Morning of that day | 0 | 0.0 | 22 | 5.5 |
| Up to the next day | 8 | 2.0 | 8 | 2.0 |
| Immediately using bull | 58 | 14.5 | 54 | 13.5 |

### 4.6. Results of Inbreeding problem in the study area

The maximum perception of the respondents toward inbreeding problem was recorded in Ajjbar kebele 94 (23.5%) followed by mello 87 (21.8%) and the least is recorded in Abaregagne 55 kebele (13.8%) and summarized in (Table 7).

Table 7: Inbreeding problem in the study area

| problems | Kebeles | | | | | Total No.of respondant (%) |
|---|---|---|---|---|---|---|
| | Ajbar | Mello | Segnogebeya | Woyblla | Abaregagne | |
| Low genetic improvement | 25(26.6) | 24(27.6) | 18(22.0) | 15(18.3) | 13(23.6) | 95(23.8) |
| Low milk production | 23(24.5) | 8(9.2) | 17(20.7) | 17(20.7) | 10(18.2) | 75(18.8) |
| Low adaptability | 35(37.2) | 34(39.1) | 27(32.9) | 29(35.4) | 16(29.1) | 141(35.5) |
| Low genetic improvement and milk production | 11(11.7) | 21(24.1) | 20(24.4) | 21(25.6) | 16(29.1) | 89(22.2) |
| Total | 94(23.5) | 87(21.8) | 82(20.5) | 82(20.5) | 55(13.8 | 400(100) |

### 4.7. Result of assessment of major health problems of dairy cattle.

The major diseases reported in the study area were mastitis, respiratory diseases and problems associated with calving. Among the problems associated calving higher than others and reported in (Table 8).

Table 8: Major problems associated with AI service

| Animal health problems | Frequency | Percent (%) |
|---|---|---|
| Mastitis | 111 | 27.7 |
| Tuberculosis | 56 | 14.0 |
| problems associated with calving | 134 | 33.4 |
| mastitis and tuberculosis | 26 | 6.7 |
| mastitis and problems associated with calving | 35 | 8.7 |
| All | 38 | 9.5 |
| Total | 400 | 100 |

## 5. DISCUSSION

Assessment of problems associated with artificial insemination services in and around Debre Tabor town was conducted on 400 respondents (dairy owners, animal health professionals and AI technicians) supported by questionnaire survey in five different kebeles. The research showed that from 400 respondents 280 (69.9%) were not satisfied in different ways in the use of AI service during the time of weekends and holidays, this was due to the shortage of AIT, shortage of input. On the other hand, 120 (30.1%) were satisfied in AI service, this result agrees with the reports of Dessalign (2008).

In all the study kebeles, there was statistically significant difference in shortage of AIT ($P<0.05$) this might be due to the cattle population and AI service were not synchronized. This agrees with the reports of Dessalegn (2008). Among the study kebeles, Segnogebeya had the least shortage of AI technicians which accounts about (11.0%) from the total study population where as the highest number of shortage of AI technicians were found in (90.9%). There was statistically significant difference among the study areas in shortage of inputs ($p<0.05$). This might be due to uneven distributions and production of semen in National Artificial Insemination Center (NAIC), Amhara Regional Administrative State Artificial Insemination Center (ARASAIC) and South Gondar zone artificial insemination center.

The present study revealed that 34.2% of the smallholder dairy farmers have got AI service regularly and without interruption while 65.8% of them do not due to unavailability of AITs 44.8%, discontinuation of service on weekends and holidays 32.2% and lack of inputs 25.0% with statistical significance between kebeles ($P<0.05$) for shortage of AITS and inputs which is higher than the result reported by Desaleng (2008) 27.7 % and 62.3% and Ephrem (2011) 30.2% and 59.8%, at Kaliti and Wolaita Sodo towns, respectively. In this study, there was statistically significant difference in shortage of AIT ($P<0.05$) among the kebeles, this might be due to uneven distribution of AITs and the number of dairy cattle owners in which in line with the findings of Desalegn (2008) and Zerihun *et al* ( 2013).

The current study revealed that the AI beneficiaries use natural mating102 (38.2%) when the service discontinued due to different factors and postpone time of insemination for the next cycle

of insemination178 (61.8%). These were the possible solutions of AI users when the service discontinuous due to holiday and absence of AITs during time of onset of heat which is comparable with the result reported Ibrahim *et al* (2014) 37.5% and 62.5% respectively at Jimma zone and agrees with Zewdie *et al* (2006) and Zerihun *et al* (2013).

In this study period the major constraints of AI delivery system were stated in their order of importance here below. The most outstanding constraints of AI services were conception failure (38.3%), death or dystocia (32.5%), unavailability of AITS and conception failure (20.0%), unavailability of AITs (19.5%) in the study kebele, Ajbar, Mello, Mello and Woybla, respectively in order of their importance (Table 2). This study contradicts with the study of Ibrahim *et al.* (2014) in which the overall most outstanding constraints of AI service identified in this study area were deficiency of inputs (10.4%), insufficiency of concerned body support (12.8%), conception failure (18%), shortage of AITs (31.3%), poor awareness creation in dairy farmers about the AI service (16.7%), insufficient distribution of AI center in the country (16.7%), inadequate budget allocation (8.3%), disease (15.6%), problem of repeat breeding and ways of communication of dairy cattle owners with AITs. And also this study was not in line with the study done by Tadesse *et al* (2014) in which during his study period the most serious constraints of AI service were, feed source, perception of AI users about AI, poor oestrous detection systems, efficiency of AITs, distance from local AIC, management of AI at official level, input for AI activity, price for AI and disease in the order of their importance. The major AI service constraints ranked as, efficiency of AITs, heat detection systems, availability of AI service, perception of AI users about AI, distance from local AIC and price for AI the order of their importance according to the study done by Hayleyesus (2006). According to Damron (2000) heat detection; AITs efficiency and fertility level of the herd was the most severe problems of AI service delivery.

Even though, different from my study result, all of them were exploiting or stating the major problems of AI service. The problem of repeat breeding was also mentioned by farmers and hence needs to be seriously addressed. High numbers of services per conception might be the results of problems associated with poor semen quality, poor semen handling practices, discontinuation of incentives to AI technician, season of breeding, management factors in relation to estrus detection, timing of insemination and poor insemination practices. Way of communication systems and long distance travelling to AI beneficiary are make the AI service

challenge full farmers. As a result transportation, telephone, infrastructure and other agricultural practice need further attention for the development of AI activity. This problem in general might be due to the responsible bodies are not giving a proper attention to the AI services which indicates that decision makers need to work hard to improve the situations of AI operation in the study Areas and also at national level widely. Concerning AI technicians, not only their skill problem, but also motivation, attitudes and the facilities available have profound influence on the outcome of AI service which might be resulted from lacks of job training and other incentives.

Among the study kebeles in estrus detection about 55.5% of the dairy farmers detect their dairy cows by observing mounting of the cow on other animals, redness and mucus discharge of the vulva (9.2%), restlessness and nervousness (20.0%) and loss of appetite (15%).Majority of my result is higher than that reported by Milkessa, (2012) with 16.9% for mounting of the cow on other animals, 10% for redness and vulva discharge, 4.6% for bellowing and 3.1% for restlessness and reports of Ibrahim *et al.(*2014) with 32.8% by observing mounting of the cow on other animals, redness and mucus discharge of the vulva (9%), restlessness and nervousness (6.6%) and loss of appetite (4.9%). This might be due to good management practice, absences of disease, and awareness of the community about the detection system of oestrous in my study area.

About 83% of AI beneficiaries inseminate their cows and heifers at the right time of insemination. Thus, when the cow shows heat sign in the afternoon of the day and morning, they allow their cow to be inseminated at early morning of the next day and late afternoon of that day, respectively. This study has shown that when their cows and heifers shown heat afternoon of the day, 40.9% of households inseminate at morning of the next day and which is the right time of insemination but, the rest 59.1% of households inseminate their cows in the wrong. This study agree with Tadesse *et al* (2014) in which his study has shown that respondents have inseminated their animals, when their cows and heifers shown heat afternoon of the day, 39.8% of households inseminate at morning of the next day and which is the right time of insemination but, the rest 60.2% of households inseminate their cows in the wrong time. And also this study result shows that one fourth of AI users inseminate their cows at the incorrect time of insemination which is lower than the finding of Milkessa (2012). This difference could be due to the awareness of the community to AI service and due to the overall most outstanding constraints of AI service

identified in this study area were deficiency of inputs 25.0%, insufficiency, shortage of AITs 44.8%, poor awareness creation in dairy farmers about the AI service and problem of ways of communication of dairy cattle owners with AITs.

Respondents, especially farmers, used different methods of heat detection, but they were incapable of differentiating the time of insemination based on PM-AM rule due to poor knowledge, awareness and perception about times of insemination. As a result the beneficiaries have been exposed to loss of time, money and energy to perform AI at the centers repeatedly. Therefore, not only artificial insemination technician's efficiency but also the perceptions of cattle owners have to be given a great and enough consideration for better understanding of the right insemination time of the cows. Otherwise, the trusts of the AI beneficiaries to AI technology has been reduced and start to blame it and genetics improvement of dairy cattle strongly challenged by such like factors.

In this study, the major disease that were interfering for the proper and successful an accomplishment of the AI service, are mastitis, tuberculosis, mastitis and problems associated with calving, mastitis and tuberculosis and problems associated with calving. From the above listed diseases, the highest and the lowest were problem associated with calving (33.0%) and mastitis with tuberculosis (6.7%), respectively. This study agrees with the study of Ibrahim *et al.* (2014). These disease conditions were more prevalence in this study, it might be due to the lack of awareness of farmers for taking their animals to the diagnosis purpose in the veterinary service institution.

## 6. CONCLUSION AND RECOMMENDATIONS

Based on assessments of problems associated with artificial insemination service in and around Debretabor town kebeles, less than half of stallholder respondents have got the AI service regularly and without interruption. The most important constraints associated with AI service in the study site include conception failure, AITs problem, insufficiency of concerned body support, loss of structural linkage between AI center and service giving units, absence of collaboration and regular communication between RAIC, zonal, district and other stakeholders and inadequate resource in terms of inputs and facilities. The repeat breeding situation was a very alarming finding. Similarly, the conception rates were found to be very low. Generally, AI service in and around DebreTabor has been given little or no emphasis at the woreda and kebele level.

Therefore, based on the above conclusions the following recommendations are forwarded:

- One national body responsible to coordinate and monitor AI service, herd recording and also livestock breeding programs needs to be established and be very well organized in human and material resources;
- Selection of bulls for AI should strictly follow the standard guidelines and procedures set for the purpose and also the national livestock development policies of the country.
- The private sector should be encouraged to be involved in the AI service sector but with strict control by an active breeding policy;
- Trainings should be given at federal and/or zonal level to AIT to prevent artificial insemination failure
- Establishment of a functional breeding policy and strategy should be given at most priority and each stakeholder and professional should work hard towards its implementation;
- The AI service provision should be restructured in such a way that it responds well to the breed improvement programs of the town and woreda.

## 7. REFERENCE


Bearden, H.J., Fuquary, J.W., Willard, S.T., 2004. *Applied Animal Reproduction*. 6th ed. Mississippi State University. Pearson, Prentice Hall. Upper Saddle River, New Jersey 07458. p. 155-233.

Bekana, M., Gizachew, A., and Regassa, F., 2005. Reproductive Performance of Fogera HeifersTreated with Prostaglandin F2a for Synchronization of Estrus. *Tropical Animal Healthand Production*. 37, p. 373-379.

Bekele, T., 2005. Calf Sex Ratios in Artificially Inseminated and Natural Mated Female Crossbred Dairy Herd. In*: proceedings of the 13th annual conference of the Ethiopian Society of Animal Production*. Addis Ababa, Ethiopia, p. 225-230

Bekele, T., Kasali, O.B., Alemu T., 1991: Reproductive problems in crossbred cattle in Central Ethiopia. *Animal Production Science.* 26, p. 41-49.

CSA, Central Statistics Agency, Federal Democratic Republic of Ethiopia, 2006. Agricultural Sample Survey 2006/07, *volume II, Report on livestock and livestock characteristics*. Statistical Bulletin 388. Addis Ababa, Ethiopia. p. 9-10, 25- 27.

Damron, W.S., 2000. *Introduction to Animal Science*: Global, Biological, Social and Industry Perspectives. Oklahoma State University. Prentice Hall, Upper Saddle River, New Jersey 07458 ,p .221-224.

Daris, W., 1998. *Compendium of Animal Reproduction*. 5th ed. Intervet International B.V. 5e druk. p. 13-50.

Desalegn, G., 2008. Assessment of problems/constraints associated with artificial insemination service in Ethiopia. MScThesis, Addis Ababa University, Ethiopia.

EASE, Ethiopian Agricultural Sample Enumeration, 2003. *Statistical report on Farm Management Practice, livestock and farm implements part II*. Results at the country level. Addis Ababa, Ethiopia. p. 219-232.

Ephrem, T., 2011. Study on challenges of AI inselected woredas of Wolaita zone. A DVM Thesis, Jimma University, Jimma, Ethiopia.

Garner, D.L., 1991. Artificial Insemination. In: Cupps, P.T. (ed.), *Reproduction in Domestic Animals*. 4th ed. San Diego, California: Academic Press. P. 251-274.

GebreMedhin, D., 2005. All in one*: A Practical Guide To Dairy Farming*. Agri-Service Ethiopia Printing Unit, Addis Ababa. p. 15-21.

Gomes, W.R., 1977. Artificial Insemination. Reproduction in Domestic Animals. 3rd ed. AP Academic Press, New York. p. 257-279.

Hafez, E.S.E., 1980. *Reproduction in Farm Animals*. 4th ed. School of Medicine.Wayne state University.Detroit,Michigan, Lea and Febiger,Philadelphia, p. 337-345.

Haile Mariam, M., Banjaw, K., GebreMeskel, J., and Ketema T., 1993. Productivity of Boran Cattle and their Friesian crosses at Abernossa Ranch, Ethiopia. I. Reproductive performance and prevailing mortality. *Tropical Animal Health & Prod*. 25, p. 239-248.

Haileyesus, A., 2006. Evaluation of artificial insemination service efficiency and reproductive performance of f1 Friesian crosses North Gondar Zone, MSc Thesis, Alemaya University Ethiopia.

Heinonen, M., 1989. Artificial Insemination of Cattle in Ethiopia. Ministry of Agriculture, Addis Ababa. p. 71-84.

Hunter, R.H.F., 1980. *Physiology and Technology of Reproduction in Female Domestic Animals*. AP Academic Press, London. p. 104-138.

Ibrahim,N., Hailu ,R.and Mohammed,A., 2014. Assessment of Problems Associated with Artificial Insemination Service in Selected Districts of Jimma Zone, Jimma University College of Agriculture and Veterinary Medicine, Ethiopia. *J. Reprod. & Infertility 5, p .p.37-44.*

Lobago, F., 2007. *Reproductive and Lactation Performance of Dairy Cattle in the Oromia Central Highlands of Ethiopia with Special Emphasis on Pregnancy Period.* Doctoral thesis, Swedish University of Agricultural Sciences, Uppsala. p. 89-121.

Macpherson, J.W., 1968. Semen Placement effects on fertility in bovines. *Journal of Dairy Sci.,* 5 , p. 807.

McKenna, T., R.W. Lenz, S.E. Fenton, and R.L., 1990. None-return rates of dairy cattle following uterine body or corneal insemination. Journal of Dairy Sci., 73, p.1779.

Milkessa, G., 2012. Artificial Insemination Challenges and Impacts on Dairy Cattle in and around Ambotown, A DVMThesis, Jimma University, Ethiopia.

MoA, Ministry of Agriculture, 1996. Livestock breed development subprogram, First Draft. Addis Ababa, Ethiopia.

Morrow, D.A., Roberts, S.J., and Mc Entee, K., 1985. Postpartum ovarian activity and involution of the uterus and cervix in dairy cattle. I. Ovarian activity. The Ncornell Veterinarian. 59, p.173-190.

Mukassa-Mugerwa, E., Tegegn A., 1989. Preferal plasma progesterone concentration in Zebu (Bos indicus) cows during pregnancy. *Reproduction Nutrion Development*. 29, p.303-308.

Mukassa-Mugerwa, E., Tegegn, A., Mattoin, M. and Cecchini G. 1989. Effect of Estrus Synchronization with Prostaglandin F2a in Ethiopian highland Zebu (Bos indicus) cows. *Animal Production*. 48, p. 367-373.

Negussie, E., Brannag, E., Banjaw, K.,and Rottmann, O.U.,1998. Reproductive performance of dairy cattle at Assela Livestock farm, Arsi, Ethiopia. I: *Indigenous cows versus their F1 crosses. Journal Anim Breed Genet*. 115, p.267-280.

Salisbury, G.W., Van Demark, N.L., Lodge, J.R.,1978. *Physiology of reproduction and artificial insemination of cattle.* 2nd ed. San Francisco, W.H. Freeman. P. 385-479.

Senger, P.L., W.C. Becker, S.T. Hillers, Davidge J.K., and J.J. Reeves., 1988. Influence of cornual insemination on conception in dairy cattle. *Journal of Animal Science*. 66, p. 3010-3013.

Shiferaw, Y., Tenhagen, B.A., Bekana, M. and Kasa T., 2003. Reproductive performance of crossbred dairy cows in different production systems in the central highlands of Ethiopia. *Tropical Animal Health Production*. 25, p. 551-561.

Sinishaw, W., 2005. *Study on semen quality and field efficiency of AI bulls kept at the National Artificial Insemination Center*. MSc thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre Zeit .Ethiopia .p.13-17.

Sorensen, A.M. Jr., 1979. Animal Reproduction: Principles and Practices. Texas A & M university. Mc Graw-Hill Publishing Company. Pp. 85-107; 292-330.

Tadesse, A., 2010. The status and constraints of AI in cattle in the three selected districts of Western Gojjam Zone of Amhara Region, Ethiopia. Department of Animal Production and Technology, College of Agriculture and Environmental Sciences, School of Graduate Studies Bahir Dar University. Journal of Agriculture and Social Sciences. ISSN printing, 1813- 2235; ISSN: 1814-960X., p: 103.

Tegegn, A., Kassa, T., and Mukassa-Mugerwa, E., 1995. *Aspects of bull production with emphasis on cattle in Ethiopia*. Π. Sperm production capacity and semen characteristics.

In: Proceeding of the Third National Conference of Ethiopian Society of Animal production. p. 81-97.

Thrusfield, M., 2005. Survey in Veterinary Epidemiology. 3rd ed. Blackwell Science Ltd., Oxford,Great Britain.p.182-198.

Webb, D.W., 2003. *Artificial Insemination in Cattle*. University of Florida, Gainesville. IFAS Extension, DS 58. p. 1-4.

Williams, B.L., F.C. Gwazdauskas, W.D. Whittier, R.E. Pearson, and R.L. Nebel 1988. Impact of site of inseminate deposition and environmental factors that influence reproduction of dairy cattle. Journal of Dairy Science.71, p. 2278.34.

Yemane, B., Chernet T., Shiferaw T., 1993. Improved Cattle Breeding. National Artificial Insemination Centre. Addis Ababa, Ethiopia. P .2-8.

Zerihun, B., Malede, B. and Tewodros, F., 2013. Assessment on Problems Associated with Artificial Insemination Services in West Gojjam Zone, Ethiopia. Advances in Biological Research 7(2): 59-66, 2013, ISSN 1992-0067 © IDOSI Publications, 2013 DOI: 10.5829/idosi.abr., 2013.7.2.72142.

Zewdie E., Mussa A., Melese G.M., HaileMariam D., Perera B.M.A.O., 2006. *Improving artificial insemination services for dairy cattle in Ethiopia*. In: Improving the reproductive management of smallholder dairy cattle and the effectiveness of artificial insemination services in Africa using an integrated approach. International Atomic Energy Agency (IAEA). p. 7-14.

Zewdie, E., Deneke, N., FikreMariam, D., Chaka E., HaileMariam D., Mussa A., 2005. Guidelines and procedures on bovine semen production. NAIC, Addis Ababa.

## 8. ANNEXES

Annex 1. Questionnaire used to collect information from dairy farmers

Address: Zone.....Woreda .....Keble .....Farmer Name .....Date.....

Q1. As a user of AI, do you get the service regularly and without interruptions? 1. Yes 2. No

Q2. If your answer is to the above question is no, what is the reason for this?

1. Because the service is not available on weekends & holidays 2. Because there is shortage of AITs 3. Because there is shortage of inputs 4.all of the above 5. Others

Q3. How do you communicate with AI technicians? 1. AITs visit us daily 2. We call AITs when we need those 3. We take our cows to the AI Station

Q4. Do you get AI service on weekends and holidays? 1. Yes 2. No

Q5. If your answer to the above question is no, what do you do? 1. Pass the date without breeding the cow 2. Use NM

Q6. If your cows do not conceive with repeated t inseminations, then what do you do? 1. Use AI again and again 2. Use NM

Q7. Are you aware of the problems of inbreeding? 1. Yes 2. No

Q8. Which one is the most obvious and important inbreeding problems? 1. Low adaptability 2.Low genetic improvement 3.Low milk production 4.2&3

Q9. Which animal health problems are faced so far in your dairy herd? 1. Mastitis 2. Tuberculosis 3. Problems associated with calving 4. 1&2 5. 1&3 6. All of the above

Q10. Do you have easy access to animal health? 1. Yes 2.No

Q11. Are you satisfied with the overall AI service? 1. Yes 2. No

Q12. If you can be provided with reliable and regular service, would you mind raising the Service charge? 1. Yes 2. No

Q13. Do you have any problem in using AI service? 1. Yes 2. No

Q14. What are the most problems of AI service? 1. Inavailabilities of AITS 2.conception failure 3.Death or distocia 4.1&2

Q15. What are the signs of estrus you use in order to report your cows for AI service? 1. Mount other cows 2.rdness of vulva 3.Inapitance 4.restlesnes

Q16. When should your cow, which came in heat in the afternoon, be inseminated? 1.morning next day 2.after noon next day 3.day after next day 4.at time of AITs available 5.imidate using bull 6.upto next day 7 .afternoon that day.

Q17. When should your cow, which came in heat in the morning, be inseminated? 1..afternoon that day 2.after noon next day 3.day after next day 4.at time of AITs available 5.imidate using bull 6.upto next day 7.mornig of that day

Annex 2. Questionnaire used to collect information from AITs

Address: Zone.....Woreda .....Keble .....Name .....Date.....

Please answer the following questions precisely:

Q1. How do you evaluate the quality of training? 1. V.good 2. good 3. Poor

Q2. What is the method of service delivery? 1. stationed 2. Daily run 3. On call basis

Q3. Do you provide services on weekends and on holidays? 1. Yes 2. No

Q4. Do farmers report on time for inseminations? 1. Yes 2. No

Q5. What is the average number of cows you are covering per day? 1. 1-10 2. 11-20 3.21-30 4.31-40

Q6. Which transportation system do you use? 1. stationed 2. On foot 3. Motorbike 4. Car

Q7. What are the major problems associated with the AI service in your area?

Q8. Are you satisfied and happy with your job? 1. Yes 2.no

Q9. What are the major signs of estrus? 1.mount other cows 2.redness of vulva 3.Inapitance 4.reslessnes 5.all

Q10. Which sign is the most obvious and of practical importance?

Q11. When do you inseminate a cow, which came in heat early in the morning?

Annex 3.Evalution of AI technicians

| No | Names of AITS | Service years | Knowledge of signs of estrus | Kowledge in timing of insemination | Satisfaction By thire job | Motivation |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |

Annex4. Format used during insemination time

| No | Owner name | kebele | Estrus signs | Inseminated time | Using AI service | Using NM | Problems of AI service | Service onweeekeneds and holidays | Service charge |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

## 9. DECLARATION

I, the under signed, declare that the information presented here in my thesis is my original work, has not been presented for degree in any other university and that all sources of materials used for the thesis have been duly acknowledged

Name: Alazar Woretaw

Signature:

Date of submission: 11/ 06/2015

This thesis has been submitted for examination with my approval as university advisor

Name: Bemrew Admassu (DVM)

Signature: